

Motor Inhibition in People with Mild Cognitive Impairment: A Stop Signal Study

Angela Gori¹, Rain Paul¹, Kathi Heffner², Chiang-Shan R. Li³, Sien Hu¹

¹Department of Psychological Sciences, SUNY Oswego, NY ²School of Nursing and Departments of Psychiatry and Medicine, University of Rochester Medical Center, NY
³Department of Psychiatry, Yale University School of Medicine, CT

Introduction

- People with Mild Cognitive Impairment (MCI) show declined executive functions including inhibitory control. The current study investigated regional brain activations to motor inhibition in MCI and age-matched adults.
- Healthy adults showed inhibition-related activations in the bilateral inferior frontal gyri, pre-supplementary motor area, bilateral inferior parietal lobules, and middle occipital gyri in a stop signal task (SST) (Hu et al., 2016, *ACER*).
- In ROI analysis, the right anterior hippocampus showed lower activation in older than in younger adults during motor inhibition in the SST (Hu & Li, 2020, *Brain Sci*).
- We explored whole brain and hippocampal activations during motor inhibition in MCI performing the SST.

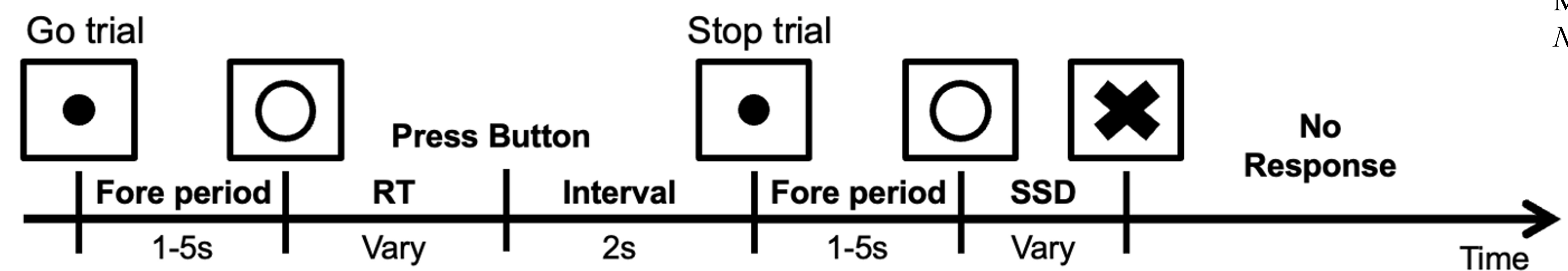
Methods

Subjects and Task:

- 16 Younger HC ($20 \leq \text{age} < 50$; 6 women, 10 men)
- 11 Older HC ($50 \leq \text{age} \leq 80$; 6 women, 5 men)
- 6 MCI ($60 \leq \text{age} \leq 80$; 4 women, 2 men)
- Three 8-minute fMRI sessions on SST
- ❖ Stop Signal Reaction Time (SSRT) = Median GSRT - SSD
- ❖ Critical Stop Signal Delay (SSD): estimated delay that led to 50% stop (Hu & Li, 2012, *Hum Brain Mapp*)

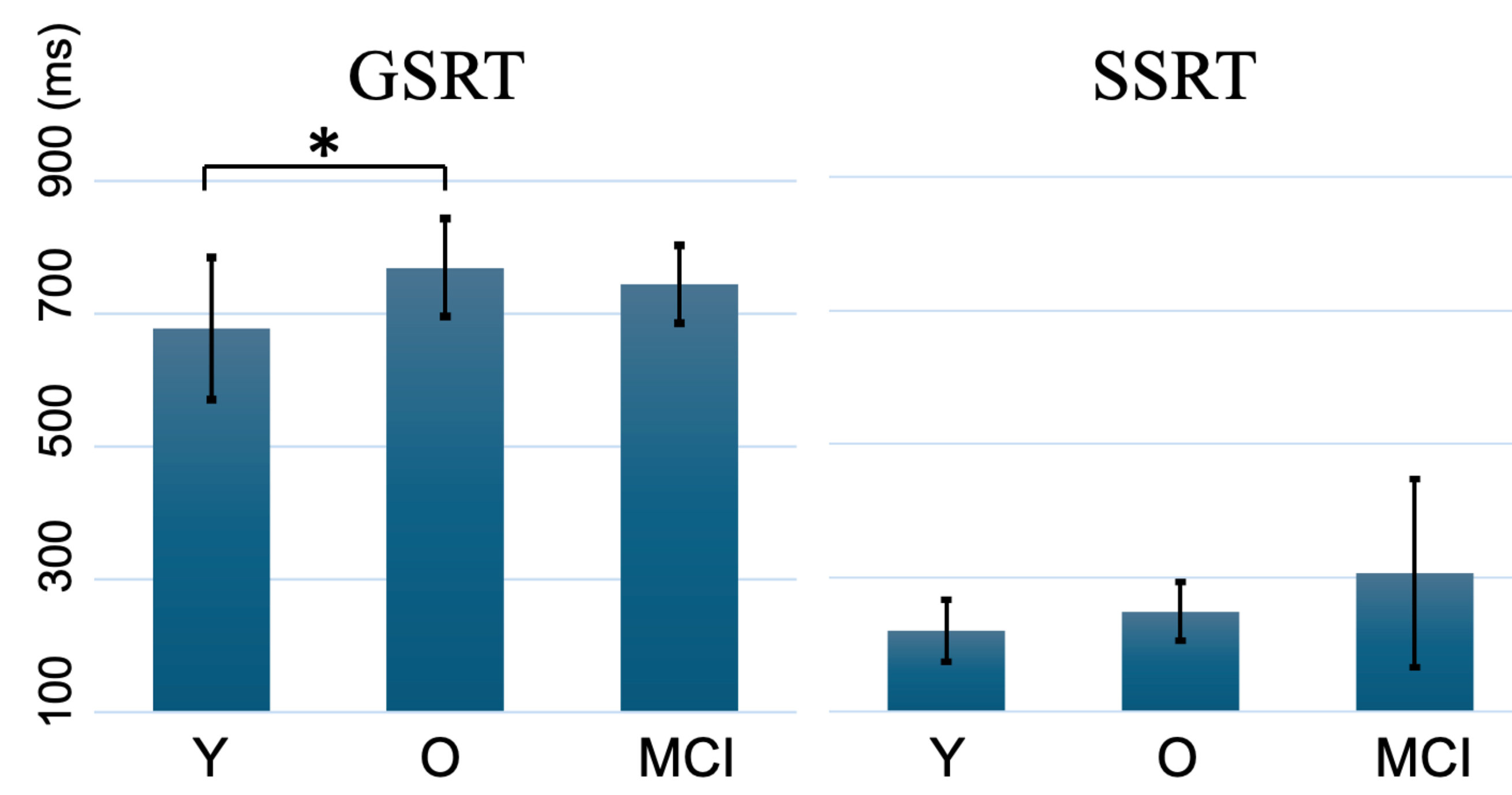
Analysis in SPM:

- 1st level: Stop Success (SS) > Go Success (GS)
- 2nd level:
 - SS>GS in All HC (Y+O) and MCI, respectively
 - MCI vs. All HC, and MCI vs. Older HC
- Small Volume Correction (SVC)
 - SS>GS in a larger sample size (Hu et al., 2016, *ACER*)
 - Anterior/Posterior Hippocampal Masks (Zeidman & Maguire, 2016, *Nat Rev Neurosci*)



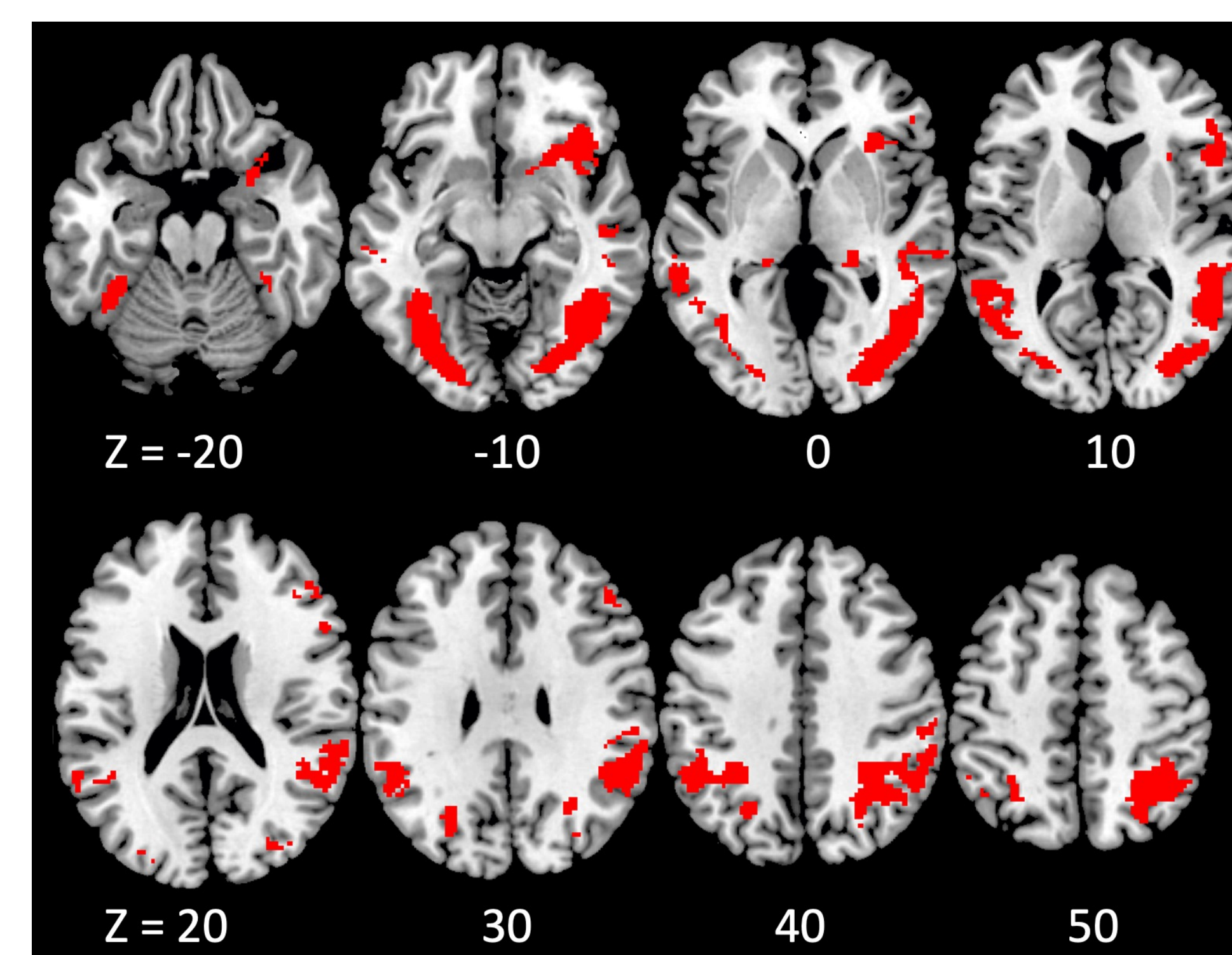
Results

Pairwise comparisons among Younger (Y), Older (O), and MCI showed no significant differences in the percentage of Go response and Stop Success response. SSRT showed a trend of $Y < O < \text{MCI}$.

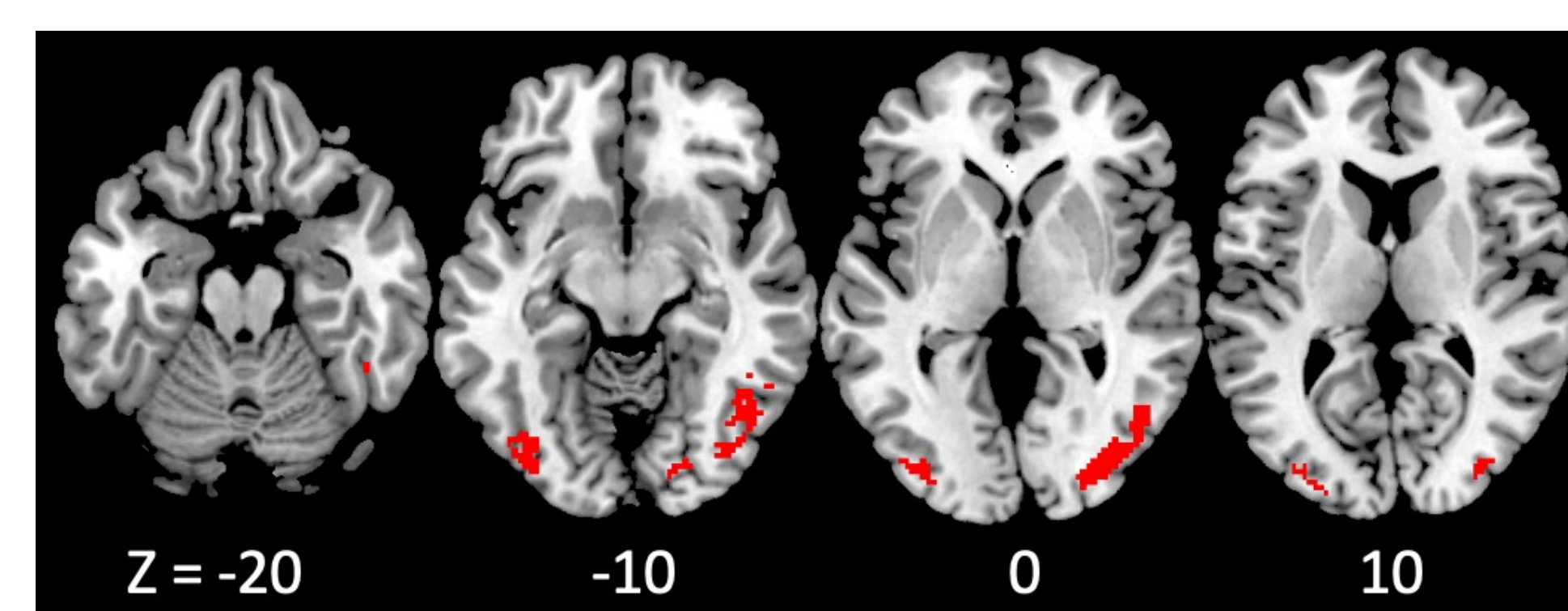


Right: SVC for results of the same contrast from a larger sample (Hu et al, 2016, *ACER*). Results at $p < 0.05$ uncorrected whole brain with $p < 0.05$ FWE at cluster or peak level.

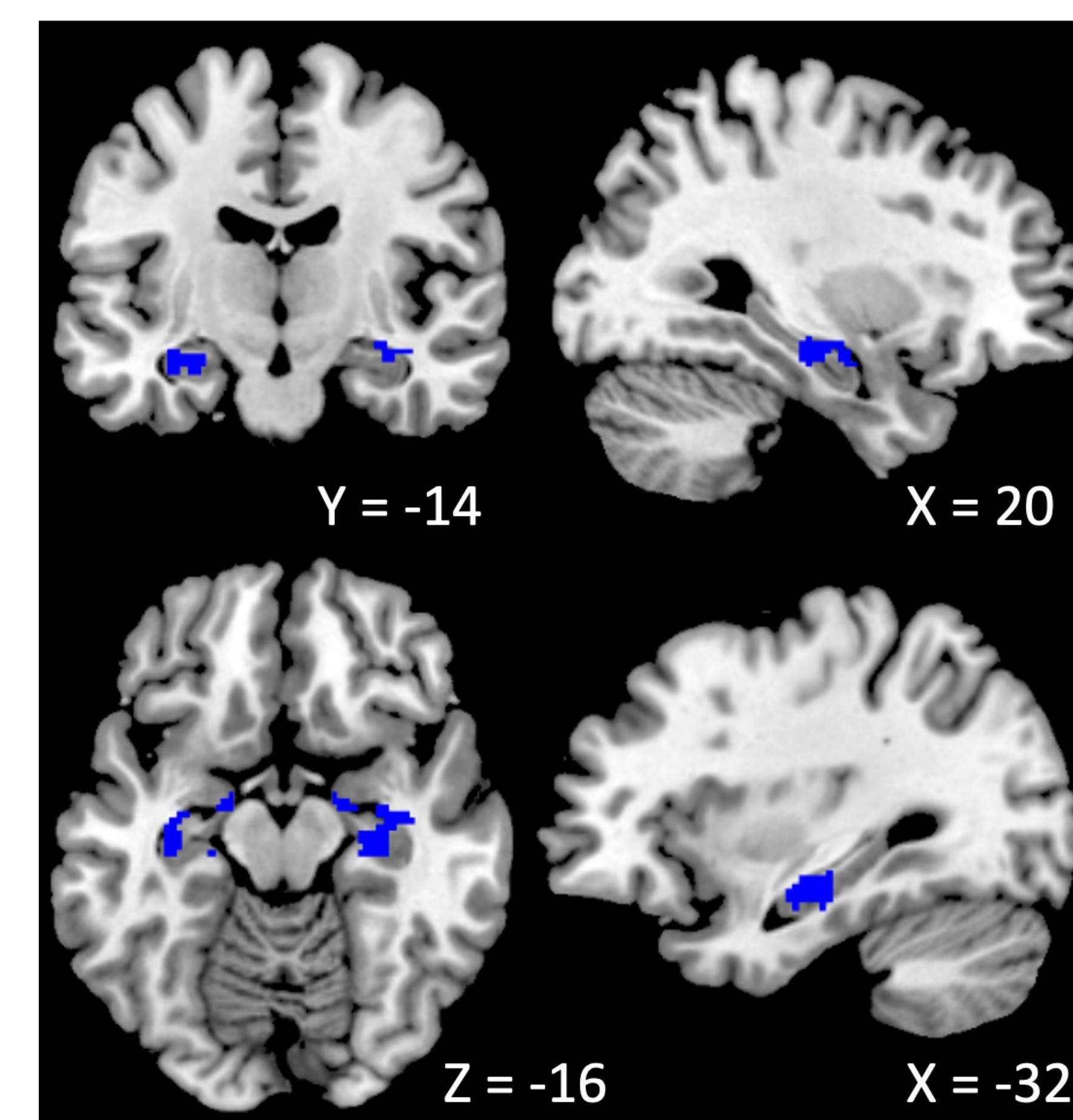
SS>GS in All HC



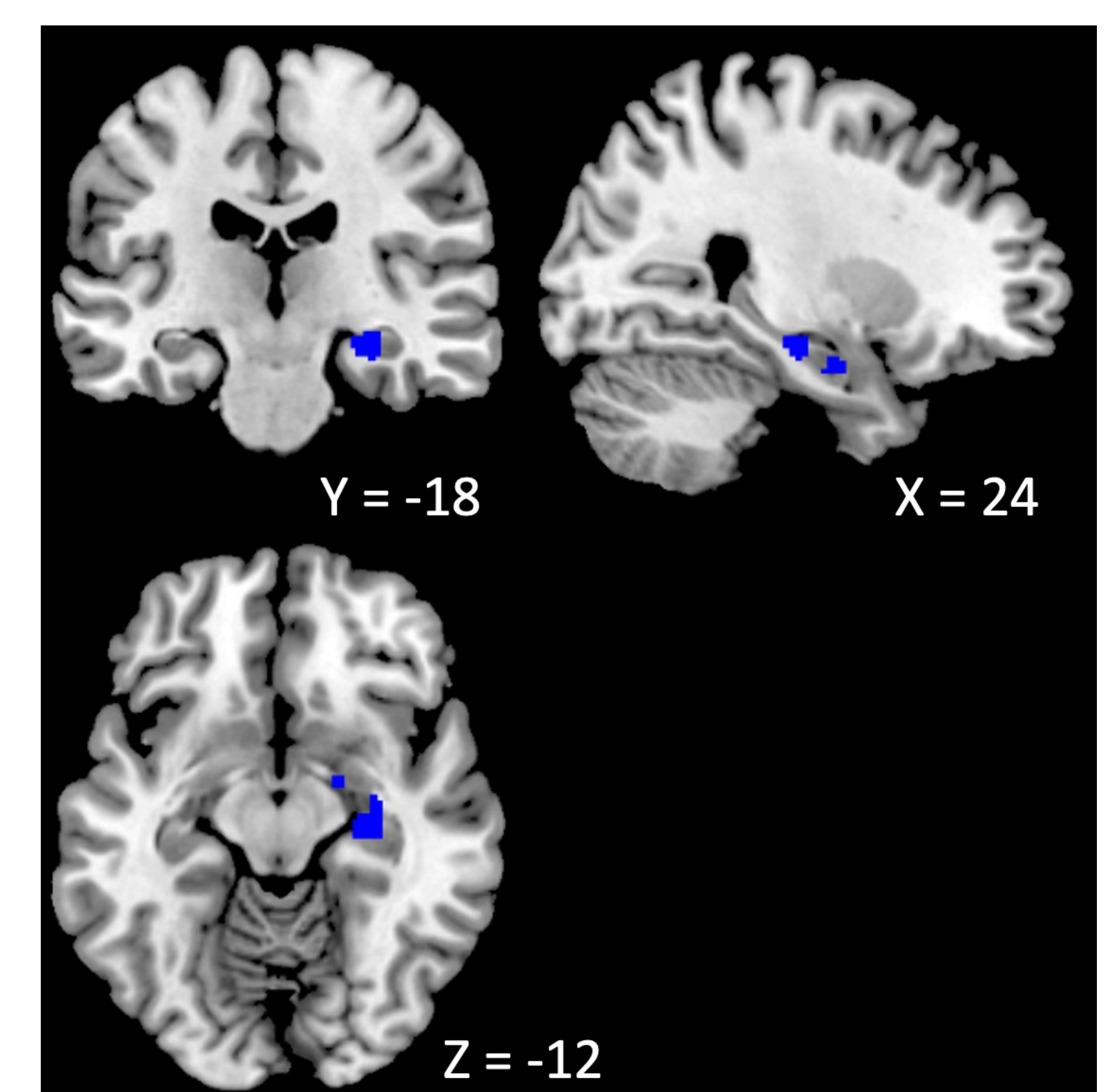
SS>GS in MCI



MCI vs. All HC in SS>GS



MCI vs. Older HC in SS>GS



Above: SVC for bilateral anterior and posterior hippocampal masks, respectively.

MCI showed lower activation in the anterior hippocampus than all HC and Older HC alone.

This study was supported by NIH grant AG078266.